

Raman Spectroscopy, Solid State Nuclear Magnetic Resonance (NMR), Rutherford Backscattering Spectroscopy (RBS), Elastic Recoil Spectroscopy (ERS), Ion Scattering Spectroscopy (ISS), Residual Gas Analyzer (RGA), Dynamic/Static Secondary Ion Mass Spectroscopy, Laser Ionization Mass Spectroscopy (LIMS), Sputtered Neutral Mass Spectroscopy (SNMS), Glow Discharge Mass Spectroscopy (GDMS), Inductively Coupled Plasma Mass Spectroscopy, Inductively Coupled Plasma Optical Emission Spectroscopy, Neutron Diffraction, Neutron Reflectivity, Neutron Activation Analysis (NAA), Nuclear Reaction Analysis (NRA) and combinations thereof, the apparatus comprising:

one or more sensors, the one or more sensors attached to a surface on the integrated circuit or micromechanical device;

wherein the energy source is a battery functional at temperatures up to 150°C;

wherein the electronic device comprises an analog to digital converter, a signal conditioning device, and a solid state memory device for collecting data;

the apparatus further comprises an external wireless receiving module wherein the collected data is transmitted digitally in real-time from the electronic device to the external wireless receiving module;

the apparatus further comprising an isolation material to protect the electronic device from hostile manufacturing or processing environments;

and wherein the one or more sensors, the electronic device components and the battery are radiation hard.